passage from the westernmost, rocky island of Savaii eastward, past reefs of diminishing size, to the last member of the group, the small Rose Atoll. Beyond that island there are some 900 miles of open sea, until the small atolls of the Society Islands begin another series leading up to the great Paumotu Archipelago. Dana explained the distribution of the reefs by assuming that the line between Rose Atoll and the Paumotus had rapidly subsided. This suggestion was in harmony with all the known facts. It has been the argument least shaken during the discussion on Dr. Murray's theory, and has accordingly kept some men firm in the Darwinian faith. Funafuti was originally recommended by the original Coral Island Boring Committee as a suitable site for bore-hole, after it had been tested by this principle in order to minimise the chance of stumbling on an area of rising sea-floor.

Now, however, Dr. Krämer, in a detailed description of the Samoan reefs, shows that the facts are not exactly as stated, and that another explanation is available. Dr. Krämer's book opens with a sketch of the literature on the coral reef controversy, which is neither complete nor altogether accurate; for he numbers Admiral Wharton among the defenders of Darwin's theory, and Prof. Sollas among its opponents. He then gives an account of the topography, meteorology and geology of the Samoan group, after which follows a detailed description of the coral reefs. The next section of the book discusses the conditions which determine the limits of coral-reef formation, and in which the most original remarks are those dealing with the influence of heliotropism. (His observations on heliotropism in corals have, by the by, an important bearing on the question of the validity of coral species founded on the nature of the corallum.) He concludes his contribution to the reef controversy by a chapter entitled "a new view of the origin of atolls." Dr. Krämer points out, during his description of the Samoan reefs, that they are not disposed exactly as they should be to agree with Dana's suggestion, that the eastern end of the archipelago is undergoing rapid subsidence. The reefs are not as regularly arranged as has been thought. Proceeding from west to east, Savaii has no very extensive reefs except on the east coast; Upolu, the next island, has large fringing reefs at the west end, fringing and small barrier reefs in the middle section, and unimportant fringing reefs at the east end; Tutuila has only a fringing reef on the southern shore, and two submarine barrier reefs further out; Manua has no important reefs; finally, the easternmost island of the chain is Rose Atoll. These facts appear conclusive that the Dana argument will not hold for its typical locality.

Krämer then proceeds to discuss the origin of the remarkable shapes of atolls, which Darwin thought it was impossible to explain on the view that atolls formed either on the rims of volcanic craters or on submerged banks. Krämer invokes the aid of great geyser eruptions, in order to widen the bases and alter the forms of submarine volcanoes. He points out that the distribution of volcanic ejectamenta depends not only on its specific gravity, for ocean currents and tides carry the material and pile it up in the dead water to the lee of volcanic islands. He reproduces a chart from Dana, showing how the trend of the coral archipelagoes agrees with that of the ocean currents in their neighbourhood; and he supports this by similar charts of the Paumutu and Marshall Islands. The difficulty of deep lagoons he explains by assuming that atolls with such, originated on crater rims; and he is more inclined to Murray's solution theory than are most writers on coral islands, although he remarks that it does not seem sufficient by itself.

The concluding section of Dr. Krämer's book deals with some biological problems of the Pacific Ocean. A few pages are devoted to the reef fauna, considered in reference to its ethnological relations, and then follows a longer account of the Plankton. The author describes his apparatus and methods at some length. The most interesting result given in this section of the book are his statistics of the comparative poverty of the tropical Plankton compared with that of the temperate zones. In an appendix on the Palolo, a worm largely eaten by the Samoans, Tonguese and Fijians, Dr. Collin re-describes its structure from excellent material collected by Dr. Krämer. He agrees with Quatrefages and Ehlers that it is a member of the genus *Lysidice*, and that Gray's genus, *Palola*, must be given up. J. W. G.

OUR BOOK SHELF.

A Treatise on Practical Plane and Solid Geometry. By T. J. Evans and W. W. F. Pullen. Pp. vi + 400. (London: Chapman and Hall, Ltd., 1897.)

IN these 400 pages the joint authors present the student, particularly the one who wishes to restrict his work to the Science and Art Department syllabus of the honours stage of the annual examination held in geometry, with the solutions of a series of problems arranged in an orderly and progressive manner. The problems are, for the most part, those which have been set at the examinations held during the years 1887 to 1896, and their solutions are accompanied, in many cases, by useful hints. There are also included the theories of isometric projection, shadows, and perspective, and several interesting miscellaneous examples, besides some of the less difficult problems which are of fundamental importance. It is not advisable for a student to limit himself entirely to the reading of such a book as this, but using it in connection with a good text-book its value will be very much enhanced: for this reason, the authors have made ample references to existing standard works. No less important are the excellent and clearly printed figures, to the number of 200, which accompany the text; these should be well studied, and, in most cases, re-drawn by the reader himself. For advanced students and teachers this collection of problems and proofs will, without doubt, prove a most useful help in their work.

Les Transformateurs de tension à courants alternatifs. By F. Loppé. Pp. 206. (Paris: Gauthier-Villars. Masson and Co.)

Électromoteurs et leurs Applications. By G. Dumont. Pp. 183. (Same publishers.)

Électro-métallurgie. By A. Minet. Pp. 195. (Same publishers.)

THESE books are the three latest additions to the well-known series published under the title of the Encyclopédie scientifique des Aide-Mémoire. All the volumes in the series have proved handy and serviceable to students of science and technology.

The first part of M. Loppé's work deals briefly with the theory of the transformer, and ideal conditions of construction; the second part is devoted to the classification of transformers, details of construction, the

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description of principal types, and the determination of the dimensions of the various parts of a transformer required to satisfy specified conditions.

M. Dumont begins his volume with a short account of the various means used for the distribution of energy. He then deals successively with different kinds of continuous current and alternate current electromotors, the advantages and disadvantages of the two types, and systems of electrical transmission of power.

M. Minet's volume is one of four which it is proposed to publish on electrolysis and electro-chemistry. One will deal with theories of electrolysis; another with electro-chemistry; electro-metallurgy is the subject of the present volume; and electric furnaces and their applications will be treated in the fourth volume. The general laws of electrolysis are described in the introduction to the volume before us, then methods of working in the wet way, with electrolytes containing dissolved salts, and afterwards processes of electro-metallurgy in the dry way, which includes the electrolysis of substances brought to a fluid state by igneous fusion, and electro-thermic reductions.

Cheese and Cheese-making. By James Long and John Benson. Pp. viii + 150. (London: Chapman and Hall, 1896.)

THOUGH this little volume bears the names of two authors, they can hardly be regarded as collaborateurs. What was the origin of the book does not appear, for there is no preface or introduction. Mr. Long writes five chapters at the beginning and three at the end, whilst the intermediate chapters, four in number, are by Mr. Benson. Each author writes independently of the other, and their respective contributions might equally well have appeared as separate pamphlets. The volume, of course, suffers from this lack of cohesion. Mr. Long's chapters are devoted to the principles of cheese-making, the trade in foreign cheese, soft cheese manufacture, Gorgonzola and the varieties of blue or moulded cheese, other varieties of fancy cheese, the milk industry, the principles of butter-making, and creameries and factories. For a chatty or discursive account of the numerous varieties of foreign cheese it may be safe to consult the volume, but the details of manufacture are hardly given with sufficient precision to possess any value for purposes of instruction. Occasionally, too, Mr. Long is a little uncertain in his choice of words, as when he makes reference to districts "where the most luxurious crops are grown"—he no doubt had luxuriant crops in mind. Mr. Benson deals with the best methods of manufacturing Cheddar, Stilton, Cheshire, and Wensleydale cheeses respectively. More care has been bestowed upon this part of the work, which in the hands of an intelligent person might usefully be employed as a guide to the making of the four varieties of English cheese specified. Connoisseurs will agree with Mr. Benson "that a well-made Stilton stands without rival amongst the better-known varieties of cheeses." One disadvantage of the dual but not joint authorship is that there is considerable repetition. Another is that the volume has no index. So well known a continental cheese as the Gruyère seems to have escaped notice, though the Gervais, Bondon, and Coulommiers receive attention. There are no illustrations.

The Naturalist's Directory. Pp. 102. (London: L. Upcott Gill, 1897.)

IT would be interesting to know what the editor of this book means by a naturalist, for we should then be better able to understand why most people whom we regard as naturalists do not appear in his list. The title-page informs us that the book is intended "for the use of students of natural history, and collectors of zoological, botanical, or geological specimens, giving the names and addresses of British and Foreign naturalists, natural history agents, societies and field clubs, museums, magazines, &c." But we have looked in the list for the names of about twenty well-known naturalists, and have not found one of them included. Perhaps the Directory only contains the names of amateur naturalists, or of naturalists inviting exchanges or correspondence?

In "a list of the principal natural history work published during 1896 in the British Isles," we notice a work on metallurgy, and several on chemistry. If these are branches of natural history, then the editor, to be consistent, should include chemists and metallurgists in the Directory.

Flowering Plants. By Mrs. Arthur Bell (N. D'Anvers). Pp. 204. Illustrated. (London: George Philip and Son.)

THOUGH this book is said to be "complete in itself," it it is not a sufficient guide to the beginner in botany, for the first chapter begins with the supposition that another volume has been read, and the meanings of such terms as "calyx," "corolla," "stamens," "pistil" are regarded as part of the mental stock-in-trade of the reader. The book has been written to introduce the reader in an easy and pleasant way to the common flowering plants; but though we read, on p. 157, "You can easily find either the common or the ivy-leaved Toad-flax for yourselves," we search in vain for any description sufficient to enable a young reader to recognise this plant. Most of the illustrations are reproductions of photographs. A few of them are good, but they are usually quite inadequate to enable the learner to identify specimens of the plants he will meet during his country walks.

Twelve Charts of the Tidal Streams near the Channel Islands and Neighbouring French Coast. By F. Howard Collins. (London: J. D. Potter, 1897.)

THESE charts show by arrows the tidal streams around the Channel Islands and as far as the neighbouring coast of France, when it is high water at St. Peter's Port, Guernsey; one, two, three, four and five hours after high water at that port; and six, five, four, three, two, and one hour before high water there. Hence, knowing the time at which high water occurs at St. Peter's Port on any particular day, the direction of the tidal streams in the neighbourhood covered by the charts at any time before or after high water can be seen. The charts are based upon Admiralty observations, and should be of service to yachtsmen in the Channel.

Guide to the Genera and Classification of the North American Orthoptera found North of Mexico. By Samuel Hubbard Scudder. Pp. 87. (Cambridge, Mass.: Edward W. Wheeler, 1897.)

THE tables and bibliographies contained in this book will prove very serviceable to students of Orthoptera in America. All the seven families of Orthoptera are found in the United States, but a large amount of work remains to be done upon them, and this volume will assist in the collection and study of material required for advancement. The author states that he "contemplates a general work on the classification of our Orthoptera, of which this is merely a Prodromus, and which may serve its purpose until the material at hand has been more thoroughly studied."

Aids to the Study of Bacteriology. By T. H. Pearmain and C. G. Moor, M.A. Pp. 159. (London: Baillière, Tindall, and Cox.)

A GOOD general idea of the science of bacteriology, especially in its pathogenic aspects, can be derived from this little book. As an introduction to the "Applied Bacteriology" of the same authors, the book should be welcomed by medical students and by all practitioners who wish to know something of the methods of bacteriological research, and to understand the significance of the results obtained.

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